

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Giacomo POLLAROLO

Serial No : Not Yet Assigned (National Stage of PCT/EP2004/053524)

I.A. Filed : December 15, 2004

For : A SYSTEM FOR DAMPING THERMO-ACOUSTIC  
INSTABILITY IN A COMBUSTOR DEVICE  
FOR A GAS TURBINE

**PRELIMINARY AMENDMENT**

Commissioner of Patents  
U.S. Patent and Trademark Office  
Customer Service Window, Mail Stop \_\_\_\_\_  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Sir:

Prior to the examination of the above-identified patent application on the merits, the Examiner is respectfully requested to amend the claims and Abstract as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Amendments to the Abstract** are reflected on page 6 of this paper.

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A system  $[(1)]$  for damping thermo-acoustic instability in a combustor device  $[(2)]$  for a gas turbine, the combustor device comprising at least one combustion chamber  $[(4)]$  and at least one burner  $[(7)]$  associated to said combustion chamber and mounted in a position corresponding to a front portion set upstream  $[(8)]$  of the combustion chamber; the damping system comprising at least one Helmholtz resonator  $[(12)]$ , in turn comprising a casing  $[(13)]$  defining inside it a pre-set volume  $[(14)]$  and a neck  $[(15)]$  for hydraulic connection between said pre-set volume  $[(14)]$  and said combustion chamber  $[(4)]$ ; said system being characterized in that said neck  $[(15)]$  is connected to one side of said combustion chamber  $[(4)]$  distant from said front upstream portion  $[(8)]$  thereof provided with said at least one burner  $[(7)]$ .

2. (Currently Amended) The system [(1)] for damping thermo-acoustic instability according to Claim 1, characterized in that said combustion chamber [(4)] is of an annular type, said at least one resonator [(12)] being set in a circumferential position about said combustion chamber, housed within an air case [(16)] for delivery of air for supporting combustion set outside an annular body [(10)] delimiting said combustion chamber.

3. (Currently Amended) The system [(1)] for damping thermo-acoustic instability according to Claim 2, characterized in that said casing [(13)] of the resonator comprises means [(18)] for delivery of a cooling fluid.

4. (Currently Amended) The system [(1)] for damping thermo-acoustic instability according to Claim 3, characterized in that said means for delivery of a cooling fluid consist of a plurality of holes [(18)] of a pre-set diameter made through the casing [(13)] of the resonator and designed to enable passage of part of said air for supporting combustion towards said combustion chamber [(4)] directly through said pre-set volume and said neck of the resonator [(12)].

5. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 4, characterized in that said holes are made only through an end plate  $[(20)]$  of said casing of the resonator, facing the side opposite to said combustion chamber  $[(4)]$ , and are arranged in positions asymmetrical to one another.

6. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 2 ~~any one of Claims 2 to 5~~, characterized in that said casing  $[(13)]$  of the resonator comprises means for selectively varying said pre-set volume  $[(14)]$  within a pre-set range.

7. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 6, characterized in that said casing  $[(13)]$  of the resonator comprises two cup-shaped tubular bodies  $[(21, 22)]$ , which are mounted in a telescopic way co-axially on one another, with respective concavities facing one another, by means of a threaded coupling  $[(23)]$ ; and a threaded fixing ring-nut  $[(24)]$ , which is coupled outside on one first  $[(22)]$  of said cup-shaped tubular bodies provided, in a single piece, with said neck  $[(15)]$  and is designed to bear axially upon one second  $[(21)]$  of said cup-shaped tubular bodies, screwed outside on the former one on the side opposite to said combustion chamber.

8. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 2 ~~any one of Claims 2 to 7~~, characterized in that said casing  $[(13)]$  and said neck  $[(15)]$  of said at least one resonator have a cylindrical symmetry and are arranged with respective axes of symmetry  $[(B)]$  thereof parallel to one another and oriented to form a pre-set angle with a direction of flow  $[(6)]$  of burnt gases that traverse said combustion chamber.

9. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 8, characterized in that said pre-set angle is substantially of  $90^\circ$ .

10. (Currently Amended) The system  $[(1)]$  for damping thermo-acoustic instability according to Claim 8 ~~either Claim 8 or Claim 9~~, characterized in that it comprises more than one of said Helmholtz resonators  $[(12)]$ , said combustor comprising more than one of said burners  $[(7)]$ ; said resonators  $[(12)]$  being mounted circumferentially in a ring, in cantilever fashion on said annular body  $[(10)]$  delimiting said combustion chamber  $[(4)]$ , in positions asymmetrical with respect to one another, both in a radial direction and in the axial direction with reference to an axis of symmetry  $[(A)]$  of said annular combustion chamber, and with the respective necks  $[(15)]$  hydraulically connected to a downstream portion  $[(5)]$  of said combustion chamber.

**Amendments to the Abstract:**

Please replace the Abstract with the attached Abstract.

**ABSTRACT**


A system for damping thermo-acoustic instability in a combustor device for a gas turbine, the combustor device including at least one combustion chamber, in particular of an annular type, and at least one burner associated to the combustion chamber and mounted in a position corresponding to a front portion set upstream of the combustion chamber; the damping system including at least one Helmholtz resonator including a casing defining inside it a pre-set volume and a neck for hydraulic connection between the pre-set volume and the combustion chamber, the neck being connected to one side of the combustion chamber at a distance from the front upstream portion thereof provided with the at least one burner. The casing of the resonator includes structure which varies the pre-set volume within a pre-set range and structure which delivers a cooling fluid.

REMARKS

By the above amendment, the claims and Abstract have been amended to delete reference characters and claims 6, 8, and 10 have been amended to delete multiple claim dependency. The Abstract has also been amended to delete "means plus function" and "said" language. Therefore, no estoppel should be deemed to be associated with this amendment.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,  
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